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(71)Applicant : CORNING INC

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(72)Inventor : LOCKER ROBERT JOHN
SAWYER CONSTANCE
BRADLEY
SCHAD MARTIN JOHN

(30)Priority

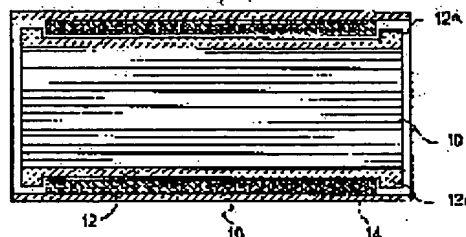
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(54) COATED CATALYST CONVERTER BASE AND MOUNTING OF THE SAME

(57)Abstract:

PROBLEM TO BE SOLVED: To improve the converter mounting durability at a high temperature by integrally mounting a heat insulating coating made of a porous fireproof coating on a surface of a honeycomb substrate of a catalyst converter.

SOLUTION: A honeycomb substrate 10 comprises a core part formed by plural through passages, and the core part 10a is surrounded by a substrate film made of a material same as that of the core, and integrally comprising a porous ceramic heat insulating coating 12 on the outside thereof. The insulating coating 12 comprises a raised edge part 12a to form a central recessed part to be placed with an intumescence mat 14, and the raised edge part 12a protects the mat 14 from the corrosion by hot exhaust gas entering a can 16 and the substrate 10, by forming a partial seal. As a material effective for the insulating coating 12, the fireproof ceramic, that is, glass, semicrystallized glass, crystalline ceramic are sued.



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CLAIMS

[Claim(s)]

[Claim 1] The low expansion ceramic honeycomb base material equipped with two or more penetration paths which had the boundary given by the envelope, And it is arranged on [some / at least] said epidermis, and consist of heat insulation porosity refractoriness coating combined there. The honeycomb object which is really by which heat insulation covering was carried out a ceramic honeycomb object, and is characterized by having porosity and thickness with said coating sufficient at least making temperature of the external surface of this coating lower [about 50 degrees C] at least than the temperature of said epidermis.

[Claim 2] The honeycomb object according to claim 1 characterized by said heat insulation coating consisting of a fireproof ceramic chosen from glass, semi-crystallization glass, and the group that consists of a crystalline substance ceramic.

[Claim 3] The honeycomb object according to claim 2 characterized by forming said fireproof ceramic from the ingredient chosen from the group which consists of powder refractoriness glass, mineral mixture, crystalline substance ceramic powder, and fizz glass.

[Claim 4] The honeycomb object according to claim 3 characterized by the ingredient used for forming said fireproof ceramic consisting of a pore formation agent chosen from the group which consists of an oxidizing quality granular bulking agent, a ceramic foaming agent and glass, or a ceramic minute ball.

[Claim 5] The honeycomb object according to claim 2 characterized by said heat insulation coating consisting of a fiber-reinforcement phase.

[Claim 6] The honeycomb object according to claim 2 characterized by forming said fireproof ceramic from the compound chosen from the group which consists of degree-of-sintering cordierite powder and reactant mixture which interacts and can form cordierite in the case of baking.

[Claim 7] The honeycomb object of claim 1 publication with which said coating is characterized by having the thickness of the range of about one to 4 mm, and the consistency of the range of about 0.5 to 1.5 g/cm³.

[Claim 8] The ceramic honeycomb object equipped with two or more penetration paths where it is a catalyst base material attachment assembly, and the boundary was given by the envelope, Heat insulation porosity refractoriness coating which has been arranged on [some / at least] this envelope, and was combined there, The assembly characterized by consisting of a part of closing container equipped with the metal wall material which puts in this ceramic honeycomb object in a closing container, and supports it and said heat insulation porosity refractoriness coating [at least], and a layer of the charge of fiber supporting material arranged between said metal wall material.

[Claim 9] The assembly according to claim 8 with which the layer of said charge of fiber supporting material is characterized by being an intumescence fiber mat layer.

[Claim 10] The assembly according to claim 9 characterized by for said heat insulation coating becoming depressed, having a part, and arranging said intumescence fiber mat layer partially at least in this hollow part.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]**[0001]**

[Field of the Invention] This invention relates to a catalytic converter useful to processing of the combustion exhaust gas from an internal combustion engine. In more detail, cost of this invention is cheap by this about an amelioration honeycomb catalyst base material and the means for supporting which attach it, and the resistance and the list to elevated-temperature heat damage with easy anchoring are provided with converter attachment equipment excellent in the resistance to an impact and damage by vibration.

[0002]

[Description of the Prior Art] In development of the attachment equipment of a catalytic converter, the temperature stability of anchoring poses a problem succeedingly. This problem is severe especially in the catalytic converter by which the so-called "close connection" which may be called the front-end converter located very much in near was typically carried out to the engine within the engine exhaust air system. Thus, by being arranged near the engine, it is put to a remarkable high exhaust-gas temperature and a remarkable large vibrational load rather than the converter by which a catalyst, a ceramic honeycomb base material, and catalyst attachment equipment have been arranged on the base of the conventional automobile experiences.

[0003] The intumescence mat is used as an attachment ingredient usually indispensable to support a ceramic base catalytic converter in a metal closing container or a "can." A mat expands and these mats consist of a mineral component chosen so that a base might be fixed in a converter can by it, when it is used for the first time and the temperature of a mat rises. Using an intumescence mat attachment ingredient for a simple substance list with other fiber mat ingredients, and restraining a ceramic honeycomb in a metal converter closing container is indicated by for example, Teng Eyck's (Ten Eyck) U.S. Pat. No. 4,863,700, and U.S. Pat. No. 5,376,341 of GURACHI.

[0004] The conventional intumescence mat ingredient is in the inclination to deteriorate at temperature higher than about 700 degrees C at an inconvenient thing. The holding pressure force done on a base with a mat decreases about this degradation, and possibility that a base will move to shaft orientations by the exhaust air back draft, and possibility that attachment equipment will finally be damaged in a list increase. In the severe heat environment and oscillating environment of a front-end converter for exhaust gas of an automobile, the heat deterioration of a mat is becoming important concerns gradually.

[0005] The problem about these anchoring is discussed in treatise No. 952414 and 960563 of the Society of Automotive Engineers. Generally, it is shown by the experiment explained in full detail in these treatises that the residual shear strength of conventional mat attachment equipment decreases dramatically with the environmental temperature of the range of 950 to 1050 degrees C. From 1000 to 1050 degrees C, residual shear strength may descend under on the minimum level on the strength permitted. This level should offer the 3 to 4 times as many edfety factor of the pressure (15kPa) required to move a base to shaft orientations in a hot (950 degrees C) high acceleration (75g) oscillating environment for which it asked by count as this. In addition to a heat problem, mechanical degradation of the mat attachment ingredient under these frequency conditions can also be predicted.

[0006]

[Elements of the Invention] The purpose of this invention is by using heat insulation coating on a ceramic base to improve the converter attachment endurance in an elevated temperature. This technique decreases mat temperature by performing heat insulation coating on the envelope of a base, and decreasing a heat flow to a mat by it. Reduction in heat may be performed by both decreasing the radiant heat conduction and heat conduction from an envelope for placing a mat in the distance from a hot base envelope, and the heat insulation property of coating.

[0007] reduction of mat temperature was observed -- in addition, especially these coatings may be able to have many cels, and the problem of them that the dimension of a cylinder base is distorted when the honeycomb design with the thin septum of a cel is adopted as manufacture may be able to be lost, and they can raise the crushing strength of a base.

[0008] In the first gestalt, this invention really which consists of a honeycomb base material equipped with heat insulation coating on the whole on the cylindrical surface of the outside constitutes a heat insulation covering ceramic honeycomb object. This base material is a low expansion ceramic honeycomb base material of a class useful generally, although a catalyst is supported to severe chemical environment like the environment of the exhaust gas of an automobile.

[0009] Heat insulation coating arranged on the outside cylindrical surface of a base material consists of an adhesive porous refractoriness ceramic layer, and the vocabulary a "ceramic" is used here in the largest semantics that includes glass, a nature ceramic of semicrystalline like a glass ceramic, and the conventional crystalline substance ceramic that does not have a glassiness phase substantially. The layer of the porous glass, glass ceramic, or ceramic which has thermal conductivity typically lower than the thermal conductivity of a honeycomb base material serves as sufficient thickness and sufficient porosity to decrease the epidermis temperature of a heat insulation covering object remarkably low rather than the epidermis temperature of a honeycomb base material without coating, when held at equivalent honeycomb temperature.

[0010] A remarkable reduction of epidermis temperature means reduction with an epidermis temperature of about 50 degrees C at least at the honeycomb temperature of about 950 degrees C. Bulk density does not exceed about 2.0 g/cm³, but such reduction can attain it easily using porous ceramic heat insulation coating whose thickness is about 1mm at least.

[0011] In the second gestalt, this invention constitutes a catalyst base material attachment assembly, and this assembly is united with two or more penetration paths which had the boundary given by the envelope, and a honeycomb object, and consists of a ceramic honeycomb object equipped with heat insulation porosity refractoriness ceramic coating combined with all or a part of envelope. This assembly is equipped with at least one layer of the inorganic intumescence ingredient further arranged between the metal wall which supports a covering honeycomb object in a closing container, and porous refractoriness ceramic coating and a metal wall. While offering the physical protection which was excellent for the ceramic base material with this assembly, an intumescence ingredient is protected from loss of heat damage and maintenance reinforcement to this and coincidence so that it may indicate in a detail below.

[0012] Various different coating constituents may be given to a ceramic supporting-structure object, and a heat insulation coating layer may be offered. It mainly depends for special selection of coating on the heat and mechanical environment of an application which coating means in the presentation list of a supporting-structure object. Generally a presentation and property of coating are restricted by the property of the application to mean, and in a severer environment, in order to attain the service life which may be demanded, it is necessary to choose carefully both coatings relevant to a ceramic base material and it.

[0013] Severe temperature and the conditions of vibration exist especially in the location close to an engine about an application like the front-end converter of an automobile which is catalyst exhaust air Gascon Bata attached in the exhaust air system. These were not completely successful although the intumescence attachment mat which contacted both closing containers of a base and a front-end converter directly might be used for the attempt before offering the endurance attachment equipment for such a converter. When an intumescence mat contacts a base and directly, degradation of a mat starts with the gestalt of incrustation or "glaze" in base temperature higher than about 950 degrees C.

[0014] The better result is obtained by "hybrid" attachment equipment. This is equipment equipped

with the inside layer of the non-intumescence mat arranged between a base and the outside layer of an intumescence mat. The non-intumescence mat ingredient which can insulate an intumescence ingredient from the elevated temperature of a base material and which has the minimum degradation at 1050 degrees C is known. however, multiplex mat attachment equipment -- ** -- since better -- ** -- it is complicated and other problems like the resistance "which extrudes" becoming small will produce that a non-intumescence mat becomes unstable and a base material from the hybrid attachment structure.

[0015] Adhesive heat insulation coating of this invention is effective on a par with fireproof fiber mat coating of the conventional technique at least, although heat conduction from a base material to the intumescence mat ingredient of the lining cloth of a base material closing container or a closing container is decreased. Coating of this invention has more long endurance, and offers the rigid base rather again rather than the elasticity which an external intumescence mat layer may give the holding pressure force more efficiently. Therefore, the degradation problem of a fiber mat is avoided by these coatings, and possibility that a base material will be slippery during use decreases.

[0016] The explanatory view of the heat insulation covering ceramic honeycomb object offered by this invention is shown in drawing 1. In the drawing in which a cross-section edge Fig. like a honeycomb object is shown, the honeycomb base is equipped with core partial 10a which consisted of two or more penetration paths which cross a core, and this part is surrounded by base epidermis 10b which consisted of typically same ingredients as a core. The porous ceramic heat insulation coating 12 has been arranged at epidermis 10b, and it has combined with one.

[0017] As other advantages of heat insulation coating, the capacity "adjusting" an outside configuration and/or the diameter of a base otherwise the capacity which restores the external surface of the damaged base which may need to discard components, the capacity to improve the crushing strength of a base, and/or the capacity about other purposes about the engine performance of a converter are mentioned. For example, distribution of heat insulation coating may be adjusted and the covering base distribution which has a part for an end and the indented central part which became high may be offered. In order for this to protect from the hot exhaust gas which is equivalent to the end side of a converter, the central crevice in coating which may arrange an intumescence mat layer is formed. Thus, a corrosion seal is really [partial] to the corrosion of an intumescence mat offered by coating.

[0018] Drawing 2 shows the design of the heat insulation covering base equipped with the corrosion seal mentioned above which constitutes the side-face sectional view of the base 10 attached in the steel can or the closing container 16. In this anchoring, the heat insulation coating 12 contains end part 12a which forms the central crevice where the intumescence mat 14 was put on inside and which became high. Thus, end part 12a which became high forms a partial seal, and protects a mat 14 from the corrosion by the hot exhaust gas which advances into a can 16 and a base 10.

[0019] An ingredient useful although heat insulation coating of this invention is formed belongs to a fireproof ceramic, i.e., glass, semi-crystallization glass, and the group that consists of a crystalline substance ceramic generally. In order to acquire the best heat insulation property, the consistency of the selected ceramic is comparatively low. Since these complex experiences a change rapid [base temperature] and large frequently while in use, this ceramic has a comparatively small thermal expansion, and gives good thermal shock resistance to covering complex. By the heat cycle, a high expansion ingredient may deteriorate quickly for a unique thermal expansion of coating.

[0020] As a special example of the fireproof ceramic compound for heat insulation coatings of a base, the powder refractoriness glass of the silicate base, the mineral mixture which can be converted into a low expansion crystalline substance ceramic layer in the case of heat treatment, and the compound based on the crystalline substance ceramic powder which can really be converted into coating by baking heat treatment are mentioned typically. Although a foam glass constituent like the phosphate foam glass of the known aluminum base and the boron base may be suitable about a certain application, these foaming has large expansion, since reinforcement is low, the adhesion is restricted and a problem may produce it in endurance in a harsh environment like the catalyst front-end converter of an automobile.

[0021] or [that the request opened by including an oxidizing quality granular bulking agent like a graphite or other coal property additives into a coating compound in order to make the porosity of

the coating / to be used / ingredient which is high-density and has low expansion increase, and baking removing behind] -- or it may leave the closed residual pore structure. In order to enlarge porosity furthermore or to make a consistency small, it does not interfere, even if it adds to a compound the hollow bulking agent which may use during baking the foaming agent which can generate a gas within a coating compound, or contains glass or other ceramic minute balls before desiccation or baking. The latter can decrease a consistency, without increasing open porosity, and can also function as increasing the reinforcement of coating.

[0022] Depending on the application which the covering honeycomb meant, you may consider including other various additives during heat insulation coating. It may be useful to improving the reinforcement of coating to add fireproof glass, a ceramic, or textile materials like metaled fiber to some of these coating constituents. Fiber is chosen from the point of thermal expansion, reactivity, and/or a humid property about compatibility with the selected coating constituent. There is the polycrystal ceramic oxide fiber or drawn glass fiber manufactured by for example, sol gel processing and continuing baking in the example of the specific fiber which does not interfere even if it uses it.

[0023] It depends for the thickness of heat insulation coating needed on many factors including the endurance of the intumescence which should be used with coating for attaching the heat environment of the meant application, and a base, or other mat ingredients and the selected consistency of a coating ingredient, and a presentation. Generally, everything but an application with the severest coating thickness of the range of about one to 4 mm is suitable.

[0024] Generally, a ceramic ingredient is combined with a suitable temporary organic substance, or the binder / vehicle component of eternal mineral matter, it gives the external surface of a base by making them into coating, and the process which calcinates a base and coating together and forms a junctional complex is included in giving a granular ceramic ingredient as coating to a fireproof ceramic base. In a certain case, in order to secure endurance association, it may be useful to pretreat a base, and even if it attains the endurance of suitable association and complex, it does not interfere, without using a baking process in a certain case.

[0025] Whether it is beforehand calcinated according to the presentation of a base and coating or the base which performs coating is not calcinated ("raw"), it is good. The base and coating which are extruded may be a compatibility constituent, and when coating is easy to be performed in the condition raw in a base, co-extrusion of a base and coating may be useful technique.

[0026]

[Example] The following examples explain in more detail preparation and the trial of a ceramic base which have endurance heat insulation coating by this invention.

[0027] In order to offer the complex base of an automotive application including being put to the high application comparison temperature and the remarkable mechanical vibration of example 1-heat insulation coating, although coating is performed, many extrusion ceramic bases of a cordierite constituent were chosen. The selected base was a cel car (Celcor) XT cordierite honeycomb base of a circular cross section which has the honeycomb cel consistency whose each is the square inch of about 350 cels / front-face area of disconnection, the die length (parallel to a path or the direction of a cel) which is 89mm, and the diameter of 76.2mm.

[0028] Four kinds of coating compounds were chosen as giving a base. These compounds contained two kinds of compounds which can form a high crystalline substance ceramic (cordierite) ingredient in response to the time of two kinds of compounds which mainly consist of degree-of-sintering ceramic (cordierite) powder, and baking and which consist of clay, talc, aluminas, and reactant mixture of a silica. The specific selected coating compound had the presentation reported to the following table I.

[0029]

[Table 1]

表I—コーティング配合物				
コーティング成分	実施例番号			
	1	2	3	4
カーボナイト粉末(μm)	34.2	29.1		
カーボナイト粉末(μm)	34.2	29.1		
炭化ケイ素		15.6		
タルク			33.9	33.9
アルミナ			18.4	18.4
シリカ			12.9	12.9
粘土			9.4	9.4
ステアリン酸ナトリウム			2.5	2.5
メチルセルロース	0.5	0.4	1.0	1.0
ケイ酸ナトリウム溶液(40%)		20.6	3.7	
黒鉛粉末			16.5	32
水和アルミナ			7.7	7.7
水	10.5	22.1	33.0	

[0030] As a suitable component of the batch ingredient used for coating indicated to Table I Carborundum (Carborundum) carbon-dioxide powder, Pfizer (Pfizer) 96 / 68 talc, C-alkane (Alcan) 701 alumina, ASHU berry (Ashbury) 4740 graphite, Sill KOSHIRU (Sil-Co-Sil) silica powder, K-kaolin (kaolin) 10 clay, The cordierite powder manufactured by destroying and grinding an ARUKEMU (Aluchem) AC714K hydration alumina, A4M methyl cellulose, and the extrusion baking cordierite honeycomb base of marketing which is indicated below is mentioned.

[0031] coating of each coating compound reported to Table I mentioned above was applied by the thickness of 4mm by brushing to a ceramic base. In order to apply the coating compound 2-4, before applying coating, sandblasting was applied to the base, it rinsed by deionized water, the oven drying was performed, and the adhesion to the base of coating was raised. In order to apply the coating compounds 3 and 4, coating liquid was applied to multiplex and desired 4mm thickness was reached. Each layer was dried before applying the following layer.

[0032] Heat treatment is unnecessary to making the coating compounds 1 and 2 of Table I which consist of the cordierite and the inorganic sodium-silicate binder which were crystallized beforehand harden applied coating. Although the graphite baking ***** additive and the reactant mineral powder for raising porosity were contained, the compounds 3 and 4 which do not contain a silicate inorganic binder were stiffened according to the further baking process after desiccation, and attained the best result.

[0033] : the baking process useful for stiffening the reactant coating compounds 3 and 4 from Table I is indicated to be to the following table II [0034]

[Table 2]

表II—コーティングの焼成		
ソーク/傾斜	温度(℃)	期間(時間)
ソーク	室温	0
傾斜	200	1
傾斜	410	7
傾斜	600	6
傾斜	900	5
傾斜	1100	4
傾斜	1350	11
傾斜	1400	6
ソーク	1400	7
傾斜	1375	1
傾斜	室温	13.5

[0035] This baking processing is effective for converting the desiccation clay / talc / alumina / silica coding of compounds 3 and 4 into adhesive coating from which a cordierite crystal constitutes the main crystal phase.

[0036] Although coating applied as mentioned above is not limited including [therefore] the thermal expansion of the comparatively large range, and fluctuation of a consistency, it is useful in various environments containing the engine exhaust air system of an automobile. Following Table III has reported the result of the consistency about each of these specific coatings, and thermal expansion. The thermal-expansion value reported to Table III is a value which shows the average

thermal expansion containing the expansion data of heating and cooling covering the temperature requirement from a room temperature to 1000 degrees C.

[0037]

[Table 3]

表III—コーティングの特性

被覆実施例番号	1	2	3	4
嵩密度(g/cm ³)	1.42	1.28	0.8	0.6
熱膨張(×10 ⁷ /°C.)	24	20	11	11

[0038] Since coating which has the presentation of the compounds 1 and 2 of Table I and the same presentation was put to temperature high enough removing residual moisture and an organic substance from desiccation coating in the environment of the exhaust air system of an automobile, using preliminary baking to 1080 degrees C before a trial, it removed these matter and adjusted it to the value which approached with the value in use [a coating property]. This heating also removed volatile matter with fear harmful to a measuring instrument.

[0039] Each average thermal expansion of these typical coating compounds was higher than the average thermal expansion (covering the same temperature requirement about 5×10⁻⁷/degree C) of the ceramic honeycomb base with which they are applied a little. Nevertheless, it turned out that the adhesion to the base of these coatings is very suitable.

[0040] Anchoring of the covering base manufactured as an example 2-covering base attached and having been mentioned above was performed using the coating method used as a practice in this industry. Generally these approaches twist an intumescence mat around the surroundings of the cylinder external surface of a base. Each of the base rolled on the mat is inserted into the loose tubular metal closing container which consists of a steel sheet beforehand formed in the shape of [which encloses a mat and a base substantially] a cylinder. Overlap the edge of a steel sheet, close and the edge where the steel sheet finally overlapped is fixed at the same time it applies **** to this assembly and carries out the precompression of the volume attachment of the mat between a steel sheet and a base. Each process which maintains the mat compression level of the request between a base and the closed cylinder steel shell is included.

[0041] In the case of a covering base which was offered according to the example 1 mentioned above, by machining hardened coating, even if it adjusts except for the irregularity of coating in the final dimension which chose the outer diameter of a covering base beforehand, it does not interfere. You may machine with a suitable means including wet wheel grinding finishing or dry type sandur finishing, rotating a covering base within an engine lathe. When using the latter technique, desired coating finishing is offered by machining the base manufactured according to the example 1 to the final coating thickness of the range of about 1.92 to 3.36 mm, without barring the thermal ability of coating.

[0042] Mat volume attachment of these bases was performed using the series 100 intumescence mat which is marketed from the conventional intumescence mat (Minnesota, Minneapolis), i.e., 3M company, and which has the mat weight of 3100 g/m². one of the mat of this -- it twisted and only the layer was used.

[0043] It has arranged in the sheet steel closing container which turned at the base with which the mat was twisted in the shape of a cylinder, this closing container was closed by ****, and the compression mat consistency ("gap bulk density") of about 1.1 g/cm³ was attained in the intumescence mat. The level of this compression is chosen and a base makes good resistance over what "is extruded" from a closing container under the exhaust air pressure usually experienced in the exhaust air environment of an automobile.

[0044] Coating of some ceramic honeycomb bases which have not prepared heat insulation coating for the purpose of the comparison was carried out using the same coating method as what was used as mentioned above about the covering base sample. The layer of the duplex of the series 100 intumescence mat for coating was prepared in one group of the non-covering honeycomb base called A group, and it was provided with the combination mat weight of 6200 g/m² between each base and its steel closing container. **** which offers the compression mat consistency of about 1.1 g/cm³ was used for the group of this sample.

[0045] The thermal break of a non-intumescence mat was first given to the second group of a base

called B group, and, subsequently the series 100 intumescence mat was given to it. The non-intumescence mat chosen about this group is a fiber Max (Fibermat) refractoriness fiber mat which is marketed from a uni-flux company (New York State, Niagara fall), and has the mat weight of 800 g/m².

[0046] Since gap bulk density could not measure easily about the offered complex mat structure, although coating of these samples is carried out, eye **** shell pressing to the mat compression level of 1700psi was used.

[0047] As mentioned above, the technique to a "hybrid" complex or hybrid [which used the base of B group for carrying out coating] Bind tight was designed so that damage on the intumescence mat by the elevated temperature of base epidermis might decrease. By damage on such a mat, reduction of mat compression of the base with which an intumescence mat like the base of A group was twisted may be experienced, and the danger of a base of "extruding" may increase after the heat aging in the exhaust air system environment of an automobile.

[0048] Example 3 - It examined, after attaching the covering base offered according to the engine-performance example 1 of the attached base in a closing container according to an example 2, and the attachment property important for the engine performance in the exhaust air application of an automobile was measured. One of such the properties is the property of the mat temperature in a mat / converter interface in case mat temperature is the highest at the mat temperature under actuation of a converter, and the most important thing. It is the property of the resistance to what the converter after aging of the attachment sample in the operating environment which simulated the second property "is extruded for."

[0049] In order to measure the temperature of the mat / base interface in the attached converter, the thermocouple has been arranged to the interface in a representative sample from each group of the coating base indicated in the example 2 in the midst of the assembly of a converter. In the midst of the next trial, each attached base was heated to typical operating temperature by the twisted electric resistance heating element which is located in the honeycomb cellular structure inside of the body, and the temperature of a mat / base interface was recorded.

[0050] The location of comparatively thin heat insulation coating, for example, the location of the thickness which is about 2mm by which coating was formed, and the thickness of coating measured the temperature of an interface in both "thick" locations typically near 3mm about the covering base. It was what depends fluctuation of interface temperature rather rather than the effectiveness of an insulation of the mat of a thermometry typically at heating of an uneven base in the case of the base sample which has not been covered.

[0051] Following Table IV is listing the result of the thermometry value of the interface collected from some heating converter samples created as mentioned above. All the temperature reported to Table IV is mean temperature which is some measured value typical in the configuration of each sample which was measured from a different location of three or more places in each case.

[0052]

[Table 4]

表IV-マット界面温度				
比較例		被覆基体実施例		
試料番号	T(℃)	試料番号	薄い位置 T(℃)	厚い位置 T(℃)
A群, #1	1005	1	930	895
A群, #2	1007	2	935	876
B群, #1	892	3	913	914
B群, #2	873	4	902	911

[0053] The interface temperature of a heat insulation covering base is remarkably lower than the case of the base of A group even in the area of comparatively thin heat insulation coating so that clearly from the data reported to Table IV. In a certain case, it was effective almost like [heat insulation coating / although structure does not need manufacture costs too many rather than is complicated / decreasing interface temperature] the complex mat design of B group.

[0054] Especially the capacity especially of base attachment equipment for a base to resist that of "extruding" by the high exhaust air back draft after continuing and using it for a long period of time in a severe exhaust air environment is important. At the laboratory, relative evaluation of this

property was able to be performed based on the engine performance of the attachment base after the following acceleration heat aging. Using heating arrangement of the base with which the attached converter was mentioned above for measuring mat interface temperature, it put to extended heat cycle processing first, and subsequently, with the operating temperature of a typical converter, the base was moved at shaft orientations (the direction of an exhaust gas style), and the force required to conquer the axial holding power of mat anchoring was measured.

[0055] This processing was performed to the converter assembly of a large number prepared according to the examples 1 and 2 mentioned above. Using the electric resistance heating wire arrangement mentioned above, it heated at 1050 degrees C and 5 times of the heat cycles cooled at 100 degrees C were given to each converter assembly. Each cycle was what consists of heating of 1.5 to 2 hours, maintenance at the temperature of 10 hours, and cooling of 1.5 to 2 hours.

Subsequently, the capacity of each attachment equipment which carries out a hot extrusion shear test to the assembly which aged thermally, and resists it with many same assemblies which are not aged at the bad influence of heat aging about an attachment property was measured.

[0056] In order to measure the resistance to the back pressure extrusion of a converter, each sample has been arranged in the oven held at 550 degrees C, and thermal equilibrium was made to reach. Subsequently, while holding to the temperature, the load was added to the base in shaft orientations or the flow direction of exhaust gas. This load was increased until slipping over the mat of a base was detected. The load on which the base slid was recorded and it changed into the shear strength of a pound-force required to move the base per square inch of psi, i.e., the interface area of a base/mat. Lower shear strength expresses degradation of a mat severer than generally more high reinforcement, and its same is said of reverse.

[0057] The following table V is a thing which was recorded by both psi(s) before and after heat aging about the attachment converter sample offered according to the example and which extrudes and reports shear strength. Although the value reported to Table V about each of the sample of A group of the conventional technique and B group is the average of five sample measured value, the data of the converter of an example are each measured value. The point of the data about the result of the sample reported to Table V is shown in drawing 3. This Graf used to plot the shear strength value which was calculated from the force required to move each base attached in attachment equipment to shaft orientations and which was calculated about each of the class of different sample.

[0058]

[Table 5]

表V—取付剪断強度(psi)						
	A群	B群	実施例1	実施例2	実施例3	実施例4
老化させず	114	53	98	94	105	80
老化	18	35	33	43	63	64

[0059] Although the shear strength highest in the condition that anchoring of A group of the conventional technique has not aged by having used the intumescence mat layer of a duplex was shown, shear strength was spoiled by max during aging, so that clearly by examining a drawing and Table V. The design of this anchoring was set to the minimum level of which shear strength of the examined anchoring design. This engine performance is the result of the debasement of the comparatively rapid mat under heat aging by the high temperature of the experienced base / mat interface.

[0060] The sample of B group of the conventional technique showed the aging shear strength level improved remarkably in comparison with the sample of A group. This result is based on the heat protection given to the intumescence mat by fireproof fiber base volume attachment around a base.

[0061] Finally, these data show the remarkable amelioration in the aging shear strength which remained about the covering example of this invention. These examples show fairly larger aging shear strength than the average of anchoring of A group, and are over the average remarkably to three of the cases [them]. This engine performance is an important advance in the industry of anchoring of the endurance base concerning [having simplified complexity of anchoring mentioned above, and] an automotive application and other hot working appropriation ways.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] The cross-section edge Fig. of the heat insulation covering honeycomb object offered by this invention

[Drawing 2] The cross-section flank Fig. of the attachment design by this invention

[Drawing 3] Graf who plotted converter attachment shear strength ***** before and behind heat aging about both attachment designs offered by the attachment design and this invention of a honeycomb base which are used in the conventional technique

[Description of Notations]

10 Base

12 Heat Insulation Coating

14 Intumescence Mat

16 Closing Container

[Translation done.]

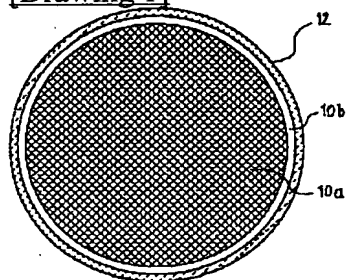
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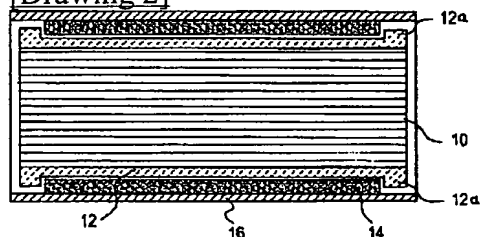
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DRAWINGS

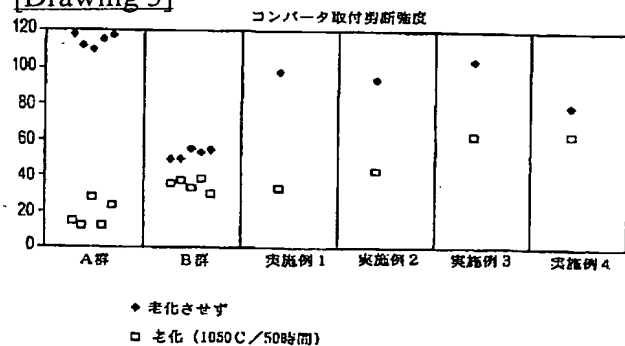
[Drawing 1]



[Drawing 2]



[Drawing 3]



[Translation done.]